

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application.

LISTING OF CLAIMS

Claim 1 (currently amended)

1. A method for making a metal-insulator-metal capacitor on a substrate comprising the steps of:  
    forming bottom electrodes from a first conducting layer on said substrate;
- 5       depositing a first wide-band-gap insulating layer  
of   silicon dioxide on said bottom electrodes;  
    depositing a high-k dielectric film over said first  
    wide-band-gap insulating layer;
- 10      depositing a second wide-band-gap insulating layer  
10    of silicon dioxide on over said high-k dielectric  
    film;  
    forming top electrodes from a second conducting  
    layer on said second wide-band-gap insulating layer.

Claim 2 (original)

2. The method of claim 1, wherein said bottom electrodes and said top electrodes are formed from a material selected from the group that includes titanium nitride, tantalum nitride, tungsten nitride,

ruthenium,

5      iridium, iridium oxide, and platinum, and is deposited  
to a thickness of between about 200 and 1000  
Angstroms.

Claim 3 (currently amended)

3.    The method of claim 1, wherein said silicon dioxide has a band gap of greater than about 8 eV first and said second wide-band-gap insulating layers are materials selected from the group that includes silicon dioxide and aluminum oxide.

Claims 4-9 (original)

4.    The method of claim 1, wherein said high-k dielectric film is a material selected from the group that includes tantalum pentoxide, silicon nitride, titanium oxide, zirconium oxide, and hafnium oxide.

5.    The method of claim 4, wherein said high-k dielectric film is deposited by physical vapor deposition.

6.    The method of claim 4, wherein said high-k dielectric film is deposited by chemical vapor deposition.

7.    The method of claim 4, wherein said high-k

dielectric film is deposited by atomic layer chemical vapor deposition.

8. The method of claim 4, wherein said high-k dielectric film is deposited to a thickness of between about 50 and 800 Angstroms.

9. The method of claim 4, wherein said high-k dielectric film is treated in a gas selected from the group that includes oxygen, nitrogen, nitrous oxide, and ammonia, and rapid thermally annealed at a 5 temperature of between about 300 and 700°C for a time of between about 1 and 260 seconds.

Claim 10 (currently amended)

10. A method for making a metal-insulator-metal capacitor on a substrate comprising the steps of:  
    forming bottom electrodes composed of titanium nitride on said substrate;  
5     depositing a first wide-band-gap insulating layer composed of aluminum oxide on ever said bottom electrodes, whereby said aluminum oxide has a band gap greater than about 8 eV;  
    depositing a high-k dielectric film composed of  
10    tantalum pentoxide over said first wide-band-gap insulating layer;  
    depositing a second wide-band-gap insulating layer

composed of aluminum oxide on over said high-k dielectric film, whereby said aluminum oxide has a band  
15 gap greater than about 8 eV;  
forming top electrodes composed of titanium nitride over said second wide-band-gap insulating layer.

Claims 11 (original)

11. The method of claim 10, wherein said bottom electrodes and said top electrodes composed of titanium nitride have a thickness of between about 200 and 1000 Angstroms.

Claim 12 (currently amended)

12. The method of claim 10, wherein said first and said second wide-band-gap insulating layers composed of aluminum oxide have a thickness of between about 10 and 50 Angstroms.

Claims 13-15 (original)

13. The method of claim 10, wherein said high-k dielectric film composed of tantalum pentoxide has a thickness of between about 50 and 800 Angstroms.

14. The method of claim 10, wherein said tantalum pentoxide is deposited by chemical vapor deposition.

15. The method of claim 10, wherein said tantalum pentoxide is treated in a gas selected from the group that includes oxygen, nitrogen, nitrous oxide, and ammonia, and is rapid thermally annealed at a  
5 temperature of between about 300 and 700°C for a time of between 1 and 260 seconds.

Claim 16 (currently amended)

16. A method for making a metal-insulator-metal capacitor on a substrate comprising the steps of:  
forming bottom electrodes on said substrate;  
depositing a first wide-band-gap insulating layer  
of  
5 silicon dioxide on ever said bottom electrodes;  
depositing a multilayer of high-k dielectric films over said wide-band-gap insulating layer;  
depositing a second wide-band-gap insulating layer  
of silicon dioxide on ever said multilayer;  
10 forming top electrodes over said second wide-band-gap insulating layer.

Claims 17-18 (original)

17. The method of claim 16, wherein said bottom electrodes and said top electrodes are formed from a material selected from the group that includes titanium nitride, tantalum nitride, tungsten nitride, ruthenium, iridium, iridium oxide, and platinum.

18. The method of claim 17, wherein said material is deposited to a thickness of between about 200 and 1000 Angstroms.

Claim 19 (currently amended)

19. The method of claim 16 [17], wherein said multilayer of high-k dielectric films is composed of materials selected from the group that includes tantalum pentoxide, silicon nitride, titanium oxide, zirconium oxide and hafnium oxide.

Claim 20 (currently amended)

20. The method of claim 16 [17], wherein each layer of said multilayer of high-k dielectric films is treated in a gas selected from the group that includes oxygen, nitrogen, nitrous oxide, and ammonia, and rapidly thermally annealed at a temperature of between about 300 and 700°C for a time of between about 1 and 260 seconds.

Claims 21-23 (not entered)